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10/696,052	10/28/2003	Philippe Caze	SP02-227	5896
22928	7590	05/17/2010		
CORNING INCORPORATED			EXAMINER	
SP-TI-3-1			LEUNG, JENNIFER A	
CORNING, NY 14831				
			ART UNIT	PAPER NUMBER
			1797	
			NOTIFICATION DATE	DELIVERY MODE
			05/17/2010	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

usdoCKET@corning.com

### Office Action Summary

**Application No.**

10/696,052

**Applicant(s)**

CAZE ET AL.

**Examiner**

JENNIFER A. LEUNG

**Art Unit**

1797

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 February 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4 and 6-29 is/are pending in the application.
- 4a) Of the above claim(s) 3, 4, 10-13 and 19-25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 6-9, 14-18 and 26-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Response to Amendment***

1. Applicant's amendment filed on February 12, 2010 has been considered. Claim 5 is cancelled. Claims 3, 4, 10-13 and 19-25 are withdrawn from consideration. Claims 1, 2, 6-9, 14-18 and 26-29 are under consideration.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1, 2, 6, 8, 9, 14-18 and 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morse et al. (US 6,960,235) in view of Burdon et al. (WO 00/21659) and Haga et al. (US 2001/0016188).

Regarding claims 1, 2, 14, 15, 26 and 27, Morse et al. discloses a microstructure (see FIGs. 1-5) comprising:

a plurality of microchannel walls defining at least one microchannel 6, wherein at least

one of the plurality of microchannel walls further comprises a porous membrane 12/13; and  
at least one coating layer including a catalyst support and a catalyst (i.e., a coating of catalyst materials including platinum, platinum-ruthenium, nickel, palladium, copper, copper oxide, ceria, zinc oxide, alumina, combinations thereof, and alloys thereof, see column 5, line 65 to column 6, line 1. The examiner takes official notice that metal oxides such as alumina are well known in the art as a support material for the metal catalysts of platinum, platinum-ruthenium, nickel, palladium and copper);

wherein the coating layer is adhered to interior surfaces of the plurality of microchannel walls, including the wall comprising the porous membrane 12/13 (i.e., the catalyst materials can be imbedded within the membrane *and* the microchannel by various coating methods; see column 6, lines 1-9; see also column 3, lines 37-48).

Morse et al. appears to suggest that the coating layer coats all of the interior surfaces of the at least one microchannel 6. And, even if this were not the case, the examiner takes official notice that it would have been obvious for one of ordinary skill in the art at the time the invention was made to coat all of the interior surfaces of the at least one microchannel 6 of Morse et al. with the coating layer, to predictably enhance the catalytic activity by providing an increased surface area for interaction between the chemicals to be processed and the catalyst of the coating layer.

Morse et al. further discloses that the plurality of microchannel walls comprise glass (i.e., substrates 4a, 4b and membrane 12/13 may be made of glass; see column 2, lines 49-63). Morse et al., however, fails to disclose a “consolidated fired frit” of glass.

Burdon et al. teaches an apparatus comprising a plurality of microchannel walls defining

at least one microchannel (see page 18, lines 16-20). The apparatus may be configured for chemical processing, by providing at least one coating layer comprising a catalyst on the microchannel wall (see FIG. 14; page 36, line 26 to page 38, line 16). In particular, Burdon et al. teaches microchannel walls comprising a consolidated fired frit of glass (i.e., green-sheets composed of particles of glass, dispersed in a polymer binder, and optionally with additives, are textured using various techniques to form desired structures, such as vias, channels or cavities. The green-sheets are then laminated and sintered together to form a substantially monolithic structure, defining the consolidated fired frit of glass; see page 16, line 17 to page 17, line 10; page 18, line 3 to page 19, line 9; page 22, line 9 to page 26, line 11).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute a consolidated fired frit of glass for the glass material forming the plurality of microchannel walls in the apparatus of Morse et al., because the formation of the glass material as a consolidated fired frit of glass would allow for simple fabrication of complicated three-dimensional structures, more efficient and reliable incorporation of functional components into the device, and facilitation of large-scale manufacturing of the devices, as taught by Burdon et al. (see page 9, line 18 to page 10, line 7).

With respect to the newly added limitation, Morse et al. discloses that the catalyst containing coating layer may be applied by various coating methods, wherein thin film deposition, ion exchange and sol gel doping are listed as examples. The methods can be tailored to provide porous, high surface area coatings, to thereby enhance reaction kinetics (see column 5, line 65 to column 6, line 9). Morse et al., however, does not specifically state that the methods produce a coating layer having the catalyst uniformly distributed throughout the coating layer.

Haga et al. teaches a coating layer containing a catalyst support and a catalyst, wherein the catalyst is uniformly distributed throughout the coating layer (see, e.g., Example #1, beginning at ¶ [0090]. In the coating method, a slurry prepared by mixing a Cu/ZnO catalyst powder and a nitric acid alumina sol is applied to a substrate. The catalyst will therefore be uniformly distributed throughout the coating layer on the substrate).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the catalyst to be uniformly distributed throughout the coating layer in the modified apparatus of Morse et al., because such would have extended the reaction surface area, as taught by Haga et al. (see paragraph [0045]). Furthermore, the coating methods of thin film deposition, ion exchange and sol gel doping as cited by Morse et al. were merely exemplary. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute another known coating method, such as the coating method of Haga et al., for providing the same result of a porous, high surface area coating layer for enhancing reaction kinetics.

Regarding claim 6, the modified apparatus of Morse et al. structurally meets the limitations set forth in this product-by-process claim because the claimed product is the same as, or obvious from, the product of the prior art. The determination of patentability is based on the product itself, and not its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir.1985).

Regarding claims 8 and 9, the modified apparatus of Morse et al. meets the claims since

the coating method of Haga et al., as discussed above, specifically uses an alumina sol binder to form the coating layer having a catalyst uniformly distributed throughout the layer (see, e.g., Example #1, beginning at ¶ [0090]: nitric acid alumina sol slurried with Cu/ZnO catalyst).

Regarding claims 16-18, 28 and 29, because the modified microstructure of Morse et al. comprises each of the claimed structural components, the microstructure will, inherently, be capable of operating under an internal pressure within the instantly recited ranges, absent a showing otherwise.

3. Claim 7 is rejected under 35 U.S.C. 103(a) as being obvious over Morse et al. (US 6,960,235) in view of Burdon et al. (WO 00/21659) and Haga et al. (US 2001/0016188), as applied to claim 1 above, and further in view of Tonkovich et al. (WO 01/12312).

Morse et al. does not specifically disclose a plurality of coating layers.

Haga et al., however, further teaches the provision of a plurality of coating layers (see FIG. 1A-C, 2A-C, 3A-B) for catalyzing a reforming process, so that the partial oxidation reaction, and not an external heat source, generates the necessary heat for conducting the endothermic steam reforming reaction.

Tonkovich et al. also evidences that the provision of a layer *or layers* of catalyst material or materials, as appropriate for a given catalytic reaction, would have been a conventional design consideration in the art (see page 11, lines 25-29).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the at least one coating layer as a plurality of coating layers in the modified apparatus of Morse et al., because the provision of a plurality of coating layers, as appropriate for a given catalytic reaction, would have been a conventional design consideration in the art, as

evidenced by Tonkovich et al. Furthermore, the provision of a plurality of coating layers, as in Haga et al., would allow for the partial oxidation reaction, and not an external heat source, to generate the necessary heat for conducting the endothermic steam reforming reaction.

***Response to Arguments***

4. Applicant's arguments with respect to claims 1, 2, 6-9, 14-18 and 26-29 have been considered but are moot in view of the new grounds of rejection, as necessitated by amendment.

In particular, Haga et al. further teaches the newly claimed feature of a coating layer with "the catalyst being uniformly distributed throughout the coating layer". It would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the catalyst to be uniformly distributed throughout the coating layer in the modified apparatus of Morse et al., because such would have extended the reaction surface area, as taught by Haga et al. (see ¶ [0045]). Furthermore, the coating methods of thin film deposition, ion exchange and sol gel doping as cited by Morse et al. were merely exemplary. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute another known coating method, such as the coating method of Haga et al., for providing the same result of a porous, high surface area coating layer for enhancing reaction kinetics.

5. Upon further consideration, the provisional obviousness-type double patenting rejections as set forth in the previous Office Action have been withdrawn in view of Applicant's amendments to the claims. It is noted that the claims of copending application no. 11/016,093 and application no. 11/016,645 (now U.S. Patent No. 7,591,947) fail to recite or adequately suggest the instantly claimed microstructure having microchannel walls formed from a frit of glass and comprising at least one coating layer including a catalyst support and a catalyst,



wherein the catalyst is uniformly distributed throughout the coating layer.

***Conclusion***

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

\* \* \*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JENNIFER A. LEUNG whose telephone number is (571) 272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter D. Griffin can be reached on (571) 272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jennifer A. Leung/  
Primary Examiner, Art Unit 1797